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Copy 3 of 7

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1-0. GENERAL. During the period covered by this report, the major effort has been expended on the development of the prototype model of the airborne receiver. However, some of the circuits required further modifications and the development of these circuits is continuing.

2-0. ANTENNA.

2-1. The design of the airborne antenna has been established. This antenna consists of a U-shaped slot backed by a cavity in the form of a parallel-plate transmission line, and located on the lower surface of the nose section of the aircraft. Within this transmission line are fins which increase the electrical length of the line. The standing-wave ratio in the coaxial line connecting the antenna to the receiver has a value of about two to five within the central region of the frequency band and a maximum value of about eight at the end of the band. Work is continuing on a matching network to reduce the standing-wave ratio at the band ends. Plans are being made to make final measurements on the antenna using a full scale model of the nose section of the airplane.

2-2. Drawings have been completed which will allow the fitting of a fiberglass "radome" in the lower part of the nose of the aircraft. The slot antenna will be formed by placing metal surfaces on the inside of this fiberglass surface. The external contour of this radome is identical to the original skin contour of the aircraft.

3-0. R-F ASSEMBLY. An etched board layout for an r-f head has been completed. This layout includes simpler circuits than those of an earlier design. The board has been fabricated, one channel has been assembled on the board and tests are about to begin on this unit.

4-0. I-F ASSEMBLY. Continued investigation of the spurious signal problem has resulted in a shift of the second i-f frequency from 18 mc to 16.95 mc. In addition, the 28-mc, first i-f amplifier selectivity has been increased by adding tuned circuits. This was done to provide sufficient attenuation of a spurious response which appeared when using certain of the 16 second local-oscillator crystals. The new circuits have been built and tested satisfactorily and are about to be incorporated into the receiver assembly.

5-0. SECOND LOCAL-OSCILLATOR ASSEMBLY. The circuit design of this assembly has been completed, and the etched board has been designed and fabricated. Wiring of this prototype model has been started.

6-0. THIRD LOCAL-OSCILLATOR ASSEMBLY. Initially the lock-on period of the sweep assembly was designed to operate over a 10-second to two-minute interval. Although the original circuit could be made to operate satisfactorily in the laboratory, the two-minute lock-on period was near the design margin. Thus, in the interest of reliability, an improved lock-on circuit seemed desirable, and a circuit revision

SECRET

SECRET

which provides for a separate lock-on timing circuit, was undertaken. The revised circuit uses thyratrons and a triode and is controlled by a capacitor discharge. Formerly, this timing function was handled by the sweep capacitor in the phantastron circuit. In addition the threshold detector circuit, formerly used to effect lock-on, is to be changed to a feedback type circuit in which the received signal directly locks the sweeping oscillator. In this connection, a discriminator circuit is to be added to insure that the lock-on signal will be centered in the passband.

7-0. RECEIVER PACKAGING. Drawings have been prepared which describe the aircraft modifications necessary for mounting the receiver in its hatch compartment.

8-0. PLANNING. During the next monthly interval, the major effort will be concentrated on completing the circuit changes and hastening the conversion of the breadboard model to prototype form.

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